

MARINE ORGANISMS INJURIOUS TO SUBMERGED TIMBER IN THE BOMBAY HARBOUR

BY

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(*With one plate, 12 figures, and a map*)

Since ancient times, timber has been highly prized in marine constructions, particularly for ship-building, piles, fenders, bridges, ladders etc. At the same time the colossal economic loss caused on account of deterioration of timber structures through the action of marine organisms is well known. Nevertheless, treated timber is now recognised as being more suitable for certain purposes than metal or concrete by reason of its high resistance to corrosion, its elasticity, light weight, and comparatively low cost, coupled with high salvage value. In the United States, the United Kingdom and many other parts of the world, preservation of timber by impregnation with preservative chemicals under pressure has been practised to overcome the damage caused by marine wood borers, and of late the problem has been receiving some attention in India also. An investigation on 'The Protection of Timber against the attack of Marine Organisms' has been recently undertaken at the Institute of Science, Bombay, under the auspices of the Wood Preservation Branch, Forest Research Institute, Dehra Dun. The present account deals with the observations made on the marine organisms and their destructive activity on timber in the Bombay Harbour and other places in the neighbourhood.

THE MARINE WOOD BORERS.

The marine wood borers in general belong to two main groups—namely, the Mollusca and the Crustacea. The molluscan borers are represented by two distinct families of the class Lamellibranchiata, viz., (i) Terebinthidae and (ii) Pholadidae. The former represents the entire group of 'Shipworms'—*Teredo* spp. and *Bankia* spp.—while the latter includes the 'Piddocks'—*Martesia* spp. and the *Xylophaga* sp. Amongst the crustacean borers some members of the family Sphaeromidae, of the subclass Isopoda, are well known for their destruction to timber. These are mainly *Sphaeroma vastator* and *Limnoria lignorum*, popularly known as the Gribble.

A survey of the marine borers from Bombay, carried out during 1953-54 revealed four species of *Teredo*, three of *Bankia* and two of *Martesia*. The most common among them are *T. reynei*, *Bankia setacea* and *Martesia striata*. The other three species of *Teredo* occasionally recorded are *T. navalis*, *T. austini* and *T. pertingens*. *B. debenhami* and *B. brevis* are also obtained. The crustacean borers are found to be practically absent.

THE SHIPWORMS. (Figs. 1 and 10)

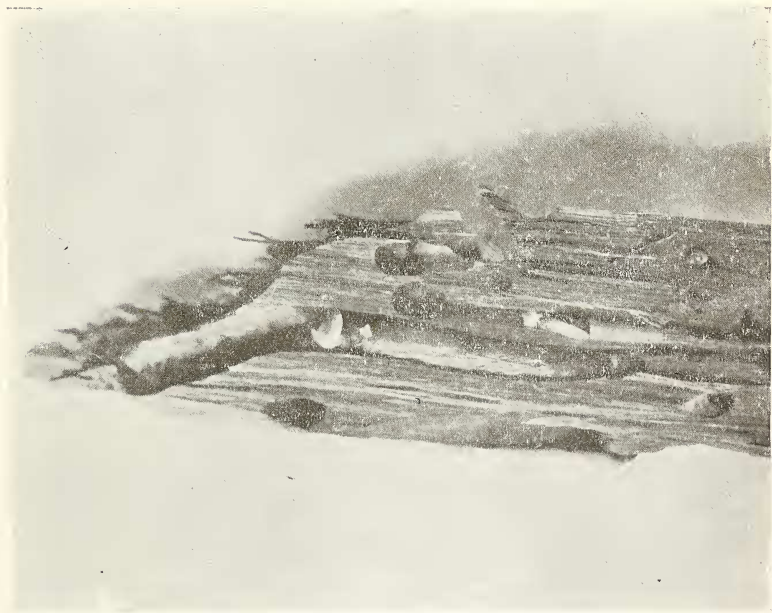
These wormlike Lamellibranchs (figs. 1, 6) have long delicate body, provided with specialized mechanisms for boring, respiration and protection, to suit the unique type of life they lead in timber. The boring apparatus consists of a pair of shell valves (figs. 2, 3, 7 and 8) surrounding the head region. The anterior and middle regions of each shell are covered with sharp, pointed, parallel ridges of teeth, which serve in scraping the wood surface, by the backward and forward movement of the valves. At the hindmost extremity of the body, there is a pair of delicate contractile tubes, the siphons (figs. 4 and 9) which project through the minute opening of the burrow. The ventral or incurrent siphon (SPH. IN) serves in intake of fresh water current for respiration, while the excreta and fragments of wood taken in during the boring process are discharged through the dorsal or the excurrent siphon (SPH. EX). The animal is afforded maximum protection by having a minute opening for its comparatively large burrow and a pair of hard calcareous structures, the pallets (figs. 4 and 9, PL), closing the opening against any external injury. The forward and backward movement of the pallets is brought about by muscular attachments in the collar region (CL). The two genera, namely *Teredo* and *Bankia* can be distinguished at a glance by the structure of the pallets. They are paddle or spoon-shaped in *Teredo* and plume-shaped with cone-in-cone elements in *Bankia* (figs. 5 and 10). The pallets serve as an important character in distinguishing the species of *Teredo* and *Bankia*, considering the great variety in their shape and structure.

It is interesting to note, that the shipworms have free-swimming larval forms, which move about for some time in search of a timber material. Soon after they settle on timber, the bivalve shell is developed. With the help of this, they start scraping timber, and grow with the size of the burrow into the worm-like adults. It is noteworthy that the burrows generally run parallel to the grain of timber. The burrow is the home of the individual, and once the shipworm is encased in it, it can never leave it, as the opening of the burrow is as small as a pin's head. After attaining a certain growth, these borers line their burrows with a film of pearly nacre, secreted by the mantle, and thus form hard calcareous tubes, which afford additional protection to the delicate body of the individual.

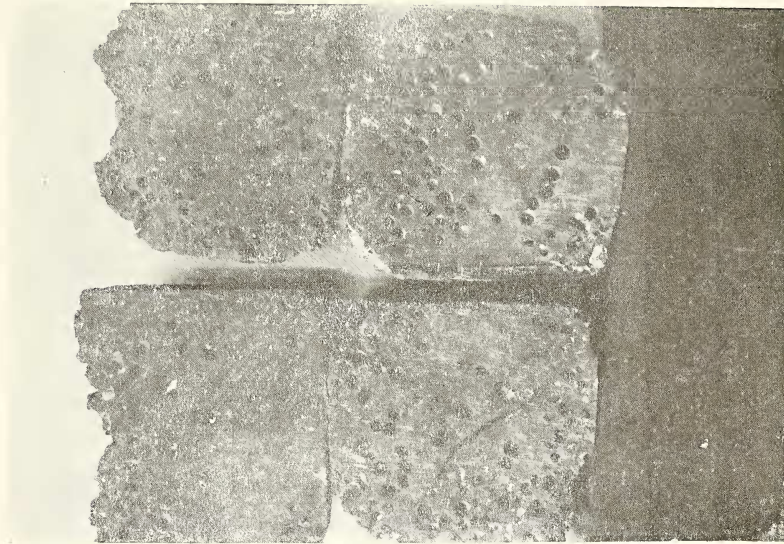
THE PIDDOCKS. (Figs. 11 and 12)

The Piddocks of the genus *Martesia* are much similar to small mussels, and are pearshaped in appearance. They are highly destructive to timber making pearshaped pockets running across the grain of the timber. The body of each individual is enclosed in a bivalve shell and is provided with paired tubular siphons, serving the same purpose as in shipworms. Similarly, they are capable of infecting timber only while minute larval forms, which gradually excavate burrows in timber with the help of their shells to accommodate the growing body.

Very little is known about the existence of the chief groups of marine wood borers and their distribution in the Bombay Harbour. A coastal survey of the Harbour was therefore undertaken with the object of inspecting the remnants of some old wooden structures, fenders, ladders and such other timber material, deteriorating by the action of marine



Sample of timber with *Teredo* specimens in their burrows, exposed.



Cross-sections of fenders destroyed by *Teredo* at Trombay.

PLATE 1 TEREDO

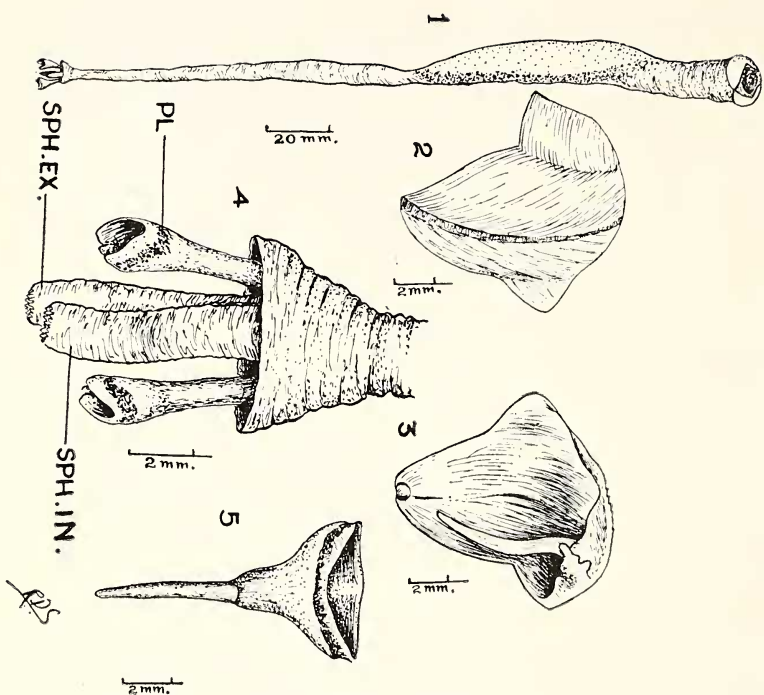


PLATE 2 BANKIA

